Intelligent Software Agents for Control & Scheduling of Distributed Generation

Contract #: 500-98-040
Contractor: Alternative Energy Systems Consulting, Inc.
Subcontractors: Reticular Systems, Inc.
Contract Amount: $554,010
Match Amount: $59,543
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Status: Completed

Project Description:
The purpose of this initial phase of this project was to develop a demonstration package of intelligent software agents for control and scheduling of distributed generation. The California Alliance for Distributed Energy Resources (CADER) projects that distributed generation could supply 20 – 40 percent of the estimated capacity that will be needed in California to both replace retired generating plants and to meet increased loads. At its most basic level, an intelligent agent is a software-based device that acts on behalf of the user.

Software agents have a number of capabilities including the ability to monitor their own execution environment, communicate with other agents or the user and maintain some representation of their own internal mental state. Software agents are characterized by their
ability to operate autonomously. This means that after an agent starts executing, no further interventions are required from the user. An autonomous agent is able to complete its task on its own. Software agents can be used in a wide variety of applications. An intelligent software agent can contain significant amounts of expertise and can be applied in systems requiring planning or learning capabilities.

Agents are particularly useful in applications involving machine to machine or man to machine communications. One popular use of agents is information seeking and cataloging on the Internet. Agents can be used in applications where they learn about an individual user and modify their own behavior to suit the information-seeking needs of the user. Agents are also useful in applications where multiple agents can communicate and cooperate with other agents for solving a given problem. These agents can be physically located on the same computer or distributed in a variety of locations. Multiple agents operating in conjunction, as an agency, can achieve goals/objectives that would not be otherwise achievable by a single agent.

Use of intelligent software agents with their ability to communicate and collaborate thus distributing the decision process, is well-suited to the task of scheduling and coordinating the activities of large numbers of DER assets. Use of agents in this fashion reduces the level of expertise needed to own and operate distributed energy resources, which in turn, allows
greater participation by owners of distributed energy resources in California's competitive
energy industry.

This project supports the PIER Program objective of:

- Improving the reliability/quality of California's electricity by enabling a greater participation by owners of distributed energy resources through the use of intelligent software agents for control and scheduling of distributed generation. Further, the research results will reduce distribution system congestion and avoid distribution line losses.

Proposed Outcome:

1. Develop and test a demonstration package of intelligent agents that communicate and collaborate to schedule operation of distributed energy resources in the California energy market.

Actual Outcome:

1. AESC produced a software package of intelligent software agents virtually controlling and scheduling distributed energy resources and fully participating in all California market activities.

Project Status:

This project has been completed and has met all of its objectives. The PIER Program is currently supporting the next project phase with the awarding of contract 500-00-016. For the final report, please right click on www.energy.ca.gov/pier/final_project_reports/600-01-010.html